

### Description

834FRB *potting and encapsulating compound* is a black, flame retardant, low viscosity two-part epoxy that offers extreme environmental, mechanical and physical protection for printed circuit boards and electronic assemblies.

834FRB is designed for applications where mechanical strength and self-extinguishing are required. Due to its low mixed viscosity, it can easily penetrate small gaps and cavities. It also provides excellent electrical insulation and protects components from static discharges, vibration, abrasion, thermal shock, environmental humidity, salt water, fungus, and many harsh chemicals.

This epoxy has a convenient 2:1 volume mix ratio, making it compatible with most dispensing equipment. 834FRB can be cured at room temperature or higher.

### Benefits and Features

- **Certified UL 94V-0** (File # [E334302](#))
- **Compliant with UL 746A**
- **Convenient 2A:1B volume mix ratio**
- **Low mixed viscosity of 2 600 cP**
- **Very high compressive and tensile strength**
- **Excellent adhesion to a wide variety of substrates including metals, composites, glass, ceramics, and many plastics**
- **Excellent Comparative Tracking Index (>600 V, PLC=0)**
- **Excellent electrical insulating characteristics**
- **Solvent-free**



### Usage Parameters

<i>Properties</i>	<i>Value</i>
Working Time <sup>a)</sup>	1 h
Shelf Life	≥3 y
Full Cure @20 °C [68 °F]	24 h
Full Cure @65 °C [149 °F]	1 h
Full Cure @80 °C [176 °F]	45 min
Full Cure @100 °C [212 °F]	35 min

a) Working time and full cure assumes room temperature and 100 g. A 10 °C increase can decrease the working time by half.

### Temperature Ranges

<i>Properties</i>	<i>Value</i>
Constant Service Temperature	-40 to 175 °C [-40 to 347 °F]
Max Intermittent Temperature <sup>b)</sup>	200 °C [392 °F]
Storage Temperature of Unmixed Parts	16 to 27 °C [60 to 80 °F]

b) Temperature that components can withstand for short periods without sustaining damage.

### Principal Components

Name	CAS Number
Part A: Epoxide Resin	28064-14-4 + 25068-38-6
Part B: Curing Amide	68410-23-1
1,1-(ethane-1,2-diyl)bis(pentabromobenzene)	84852-53-9
Antimony Trioxide	1309-64-4
Alkyl glycidyl ether	68609-97-2

### Properties of Cured 834FRB

<i>Physical Properties</i>	<i>Method</i>	<i>Value</i> <sup>a)</sup>
Color	Visual	Black
Flammability	94V	94V-0
Density @23 °C [73 °F]	ASTM D 792	1.39 g/mL
Hardness	Shore D Durometer	83D
Flexural Strength	ASTM D 790	65 N/mm <sup>2</sup> [9 500 lb/in <sup>2</sup> ]
Tensile Strength	ASTM D 638	23 N/mm <sup>2</sup> [3 400 lb/in <sup>2</sup> ]
Tensile Impact	ASTM D 1822	16 kJ/m <sup>2</sup> [7.8 ft·lb/in <sup>2</sup> ]
Compressive Strength	ASTM D 695	140 N/mm <sup>2</sup> [20 000 lb/in <sup>2</sup> ]
Lap Shear Strength (Stainless Steel)	ASTM D 1002	24 N/mm <sup>2</sup> [3 500 lb/in <sup>2</sup> ]
Lap Shear Strength (Aluminum)	ASTM D 1002	25 N/mm <sup>2</sup> [3 600 lb/in <sup>2</sup> ]
Lap Shear Strength (Copper)	ASTM D 1002	20 N/mm <sup>2</sup> [2 900 lb/in <sup>2</sup> ]
Lap Shear Strength (Brass)	ASTM D 1002	21 N/mm <sup>2</sup> [3 000 lb/in <sup>2</sup> ]
Lap Shear Strength (ABS)	ASTM D 1002	1.8 N/mm <sup>2</sup> [260 lb/in <sup>2</sup> ]
Lap Shear Strength (Polycarbonate)	ASTM D 1002	2.3 N/mm <sup>2</sup> [340 lb/in <sup>2</sup> ]
Izod Impact	ASTM D 256	2.39 kJ/m <sup>2</sup> [1.14 ft·lb/in <sup>2</sup> ]
Outgassing (Total Mass Loss) @24 h	ASTM E 595	1.88%
Water Vapor Release	ASTM E 595	0.33%
Collectable Volatile Condensable Material	ASTM E 595	0.06%
<i>Electrical Properties</i>	<i>Method</i>	<i>Value</i>
Breakdown Voltage @1.29 mm	ASTM D 149	27.4 kV
Dielectric Strength @1.29 mm	ASTM D 149	21.3 kV/mm [540 V/mil]
Breakdown Voltage @3.175 mm [1/8"]	Reference fit <sup>b)</sup>	43.0 kV
Dielectric Strength @3.175 mm [1/8"]	Reference fit <sup>b)</sup>	13.7 kV/mm [344 V/mil]
Volume Resistivity	ASTM D 257	1.4 x 10 <sup>15</sup> Ω·cm
Dielectric Dissipation, D @1 MHz	ASTM D 150-11	0.011
Dielectric Constant, k' @1 MHz	ASTM D 150-11	2.80

Note: Specifications are for epoxy samples cured at 65 °C for 1 hour, with additional curing time at room temperature for optimal results. For most tests, samples were conditioned at 23 °C and 50% RH.

a) N/mm<sup>2</sup> = mPa; lb/in<sup>2</sup> = psi;

b) To allow comparison between products, the Tautscher equation was fitted to 5 experimental dielectric strengths and extrapolated to a standard reference thickness of 1/8" (3.175 mm).

<i>Electrical Properties</i>	<i>Method</i>	<i>Value</i>
Comparative Tracking Index	ASTM D 3628	>600 V
Hot Wire Ignition (HWI)	—	45.24 s
High-Current Arc Ignition (HAI)	—	139.40 arc
High Voltage Arc Tracking Rate (HVTR)	—	24.58 mm/min
High Voltage, Low Current, Dry Arc Resistance	ASTM D 495	69.24 s
High Voltage Arc Resist. to Ignition (HVAR)	ASTM D 495	27.33 s
<i>Thermal Properties</i>	<i>Method</i>	<i>Value</i>
Coefficient of Thermal Expansion (CTE) <sup>c)</sup>	ASTM E 831	50 ppm/°C
Before T <sub>g</sub>	ASTM E 831	178 ppm/°C
After T <sub>g</sub>	ASTM E 831	0.28 W/(m·K)
Thermal Conductivity @25 °C [77 °F]	ASTM E 1461	0.33 W/(m·K)
@50 °C [122 °F]	ASTM E 1461	0.31 W/(m·K)
@100 °C [212 °F]	ASTM E 1461	39 °C [102 °F]
Glass Transition Temperature (T <sub>g</sub> )	ASTM D 3418	TBD
Heat Deflection Temperature	ASTM D 648	

c) Coefficient of Thermal Expansion (CTE) units are in ppm/°C = in/in/°C × 10<sup>-6</sup> = unit/unit/°C × 10<sup>-6</sup>

### Properties of Uncured 834FRB

<i>Physical Properties</i>	<i>Mixture</i>	
Color	Black	
Viscosity @20 °C [68 °F]	2 600 cP [2.6 Pa·s] <sup>a)</sup>	
Density	1.32 g/mL	
Mix Ratio by volume (A:B)	2.0:1.0	
Mix Ratio by weight (A:B)	2.4:1.0	
Solids Content (w/w)	~96%	
<i>Physical Properties</i>	<i>Part A</i>	<i>Part B</i>
Color	Dark Grey	Black
Viscosity @24 °C [75 °F]	1 900 cP [1.9 Pa·s] <sup>a)</sup>	4 800 cP [4.8 Pa·s] <sup>b)</sup>
Density	1.39 g/mL	1.17 g/mL
Flash Point	150 °C [302 °F]	148 °C [221 °F]
Odor	Musty	Mild


a) Brookfield viscometer 60 RPM with spindle LV S63

b) Brookfield viscometer 100 RPM with spindle LV S64

### Compatibility

**Adhesion**—As seen in the substrate adhesion table, the 834FRB epoxy adheres to most plastics and metals used to house printed circuit assemblies; however, it is not compatible with contaminants like water, oil, or greasy flux residues, which may affect adhesion. In case of contamination, first clean the surface to be coated with MG Chemicals 824 Isopropyl Alcohol.

### Substrate Adhesion in Decreasing Order

Physical Properties	Adhesion
Steel	Stronger  Weaker
Aluminum	
Fiberglass	
Wood	
Glass	
Polycarbonate	
Acrylic	
Polypropylene <sup>a)</sup>	

a) Does not bond to polypropylene

**Chemical Resistance**—*Integrity Testing Laboratories, Inc.* performed water absorbance and chemical resistance estimation of 834FRB using the IPC-TM-650 method. The chemical solvent resistance table presents the percent weight change and effect notes after this 7 day test. The results show low water absorption and a high chemical resistance to salt water and most ionic species including low concentration of sulfuric and citric acids and sodium hydroxide base. Softening and swelling occurs for aggressive organic solvents.

### Chemical Solvent Resistance (IPC-TM-650)

Physical Properties	Weight Change	Note
Water	0.23%	—
Heptane	0.25%	—
Salted Water (NaCl), 10%	0.40%	—
Sodium Hydroxide, 10%	0.42%	—
Citric Acid, 10%	0.70%	—
Ammonium Carbonate, 2%	0.70%	—
Sulfuric Acid, 3%	0.75%	—
Sulfuric Acid, 30%	0.74%	—
Ethanol	2.00%	—
Hydrochloric Acid, 5%	1.40%	—
Nitric Acid, 10%	1.80%	—
Phenol, 5%	7.60%	Softened and Swelled
Carbon Tetrachloride	16.50%	Swelled
Acetone	17.67%	Softened and Swelled
Ethyl Acetate	18.70%	Softened and Swelled
Toluene	26.74%	Softened and Swelled
Ethylene Dichloride	Ruptured	Softened and Swelled

## Storage

Store between 16 and 27 °C [60 and 80 °F] in a dry area, away from sunlight. Prolonged storage, or storage at or near freezing temperatures, can result in crystallization.

If crystallization occurs, reconstitute the component to its original state by temporarily warming it to between 50 and 60 °C [122 and 140 °F]. To ensure full homogeneity, stir the warm component thoroughly, reincorporating all settled material, then re-secure container lid and let cool before use.

## Health and Safety

Please see the 834FRB **Safety Data Sheet** (SDS) parts A and B for further details on transportation, storage, handling, safety guidelines, and regulatory compliance.

## Application Instructions

For best results, follow the procedure below.

### To prepare 2:1 (A:B) epoxy mixture:

- Scrape settled material free from the bottom and sides of **Part A** container; stir material until homogenous.
- Scrape settled material free from the bottom and sides of **Part B** container; stir material until homogenous.
- Measure **two** parts by volume of the pre-stirred **A**, and pour into the mixing container.
- Measure **one** part by volume of the pre-stirred **B**, and pour slowly into the mixing container while stirring.
- Let sit for 15 minutes to de-air.  
—OR—  
Put in a vacuum chamber, bring to 25 inHg pressure, and wait for 2 minutes to de-air.
- If bubbles are present at the top, break them gently with the mixing paddle.
- Pour mixture into the mold or container holding the components to be encapsulated.
- Close container tightly between uses to prevent skinning.

**ATTENTION!** Mixing >500 g [0.4 L] of Part B at a time into A decreases working life and promotes flash cure. Use of epoxy mixing machines with static stirrers recommended for large volumes. Limit size of hand-mixed batches.



# 834FRB Technical Data Sheet

## Flame Retardant Epoxy Encapsulating & Potting Compound

ISO 9001:2008 Registered Quality System. Burlington, Ontario, CANADA SAI Global File: 004008

834FRB

### Room temperature cure:

- Let cure at room temperature for 24 hours.

### Heat cure:

- Put in oven at 65 °C [149 °F] for 1 hour.  
–OR–
- Put in oven at 80 °C [176 °F] for 45 minutes.  
–OR–
- Put in oven at 100 °C [212 °F] for 35 minutes.

### ATTENTION!

Due to exothermic reaction, heat cure temperatures should be at least 25% below the maximum temperature the most fragile PCB component can tolerate. For larger potting blocks, reduce heat cure temperature by greater margins.

## Packaging and Supporting Products

<i>Cat. No.</i>	<i>Packaging</i>	<i>Net Volume</i>		<i>Net Weight</i>		<i>Packaged Weight</i>	
<b>834FRB-375ML</b>	Bottle	375 mL	12.7 fl oz	494 g	1.09 lb	0.6 kg	1.3 lb
<b>834FRB-3L</b>	Can	2.55 L	0.681 gal	3.36 kg	7.41 lb	4.5 kg	10 lb
<b>834FRB-60L</b>	Pail	60 L	16 gal	79.1 kg	295 lb	85.0 kg	187 lb

## Technical Support

Please contact us regarding any questions, suggestions for improvements, or problems with this product. Application notes, instructions and FAQs are located at [www.mgchemicals.com](http://www.mgchemicals.com).

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